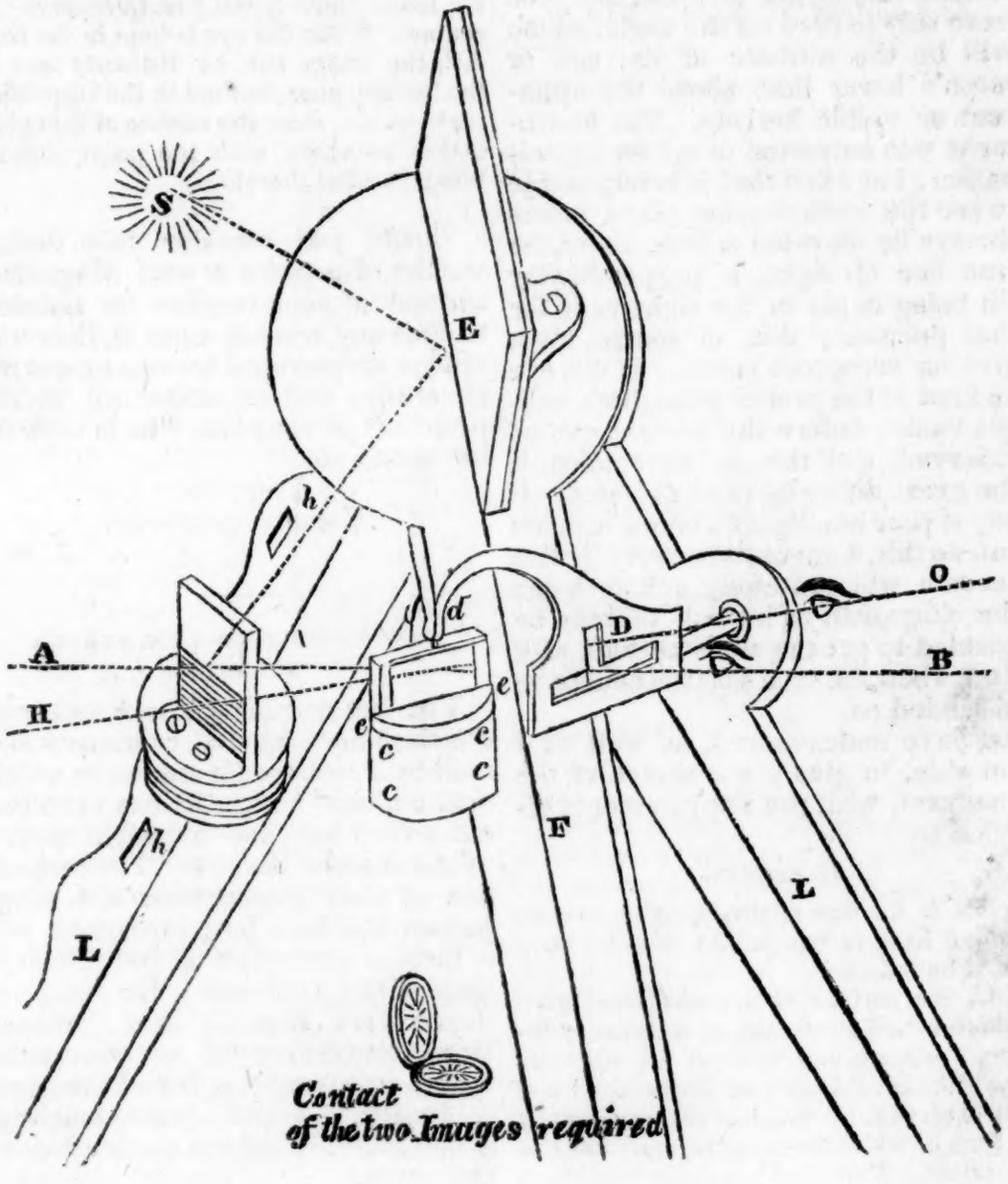
AMERICAN
# MECHANICS' MAGAZINE,
## Museum, Register, Journal, and Gazette.

VOL. I.—No. 23. ] SATURDAY, JULY 9, 1825. [ $4 PER ANNUM.

——"The charm dissolves apace;
And as the morning steals upon the night,
Melting the darkness, so their rising senses
Begin to chase the ignorant fumes that mantle
Their clearer reason." *Shakspeare.*

## IMPROVEMENT ON HADLEY'S QUADRANT.



### IMPROVEMENT ON HADLEY'S QUADRANT.

SIR,—I have long wished to call the attention of your numerous readers to an attempt at an Improvement in Hadley's Quadrant. It consists of an additional glass, suspended from the sight vane in such a manner that the surface shall be in the line of sight directed from the vane to the centre of the horizon glass. The object to be gained by this is, that when the reflected image of the sun or other celestial bodies is brought nearly to the horizon, the image of such body is also seen in the suspended glass, and, as the index is moved forward, the two reflections appear to meet each other, and the instant they come into contact you have only to read off the angle, which will be the altitude of the sun or moon's lower limb above the apparent or visible horizon. The instrument was entrusted to me for examination; but I find that it is impossible to see the contact take place unless the eye be elevated a little above the true line of sight, a perpendicular slit being made in the sight vane for that purpose; this, of course, must give an erroneous result. If the eye be kept at the proper point, both images vanish before the contact can be observed, and this, in my opinion, is the great difficulty to be obviated. If any of your intelligent Correspondents can do this, I am certain every British seaman will gratefully acknowledge the obligation, as he will thereby be enabled to get the sun's altitude at a time when the true horizon cannot be depended on.

I have endeavoured, as well as I am able, to give you a sketch of the quadrant, with the improvements alluded to.

*Description.*

AB is the line of direct sight, or horizontal line, to which any celestial body must be reflected.

C, the surface of the additional glass which is laid on the top of a brass cylinder, *c c c c*, and unscrews at *e e*, whereby the glass is held tight at the points, *i i*, of the cross bar, by which it is suspended by a ring, *d*, which turns in the cross bar like a swivel. The glass is a piece dark stained, for the sun; for the moon and stars, white; or, instead of stained glass, a piece painted black underneath, so that there may be but one reflection.

D, the sight vane, with the horizontal and perpendicular slit.

E, the speculum of the index reflecting the sun, S, into the horizon glass, G, and thence along the line of sight on the face of the suspended glass, C.

F, the index bar, which shows on the arch the sun's altitude.

LL, the limbs of the instrument.

*h h*, The holes for the shades, which are here omitted to prevent unnecessary confusion.

HO, the line of sight, when the eye is directed through the upper part of the perpendicular slit, when the image of the sun can be seen, in the suspended glass, but not in the horizon glass, distinctly, as the lower limb is too low to observe the contact. When the eye is kept in the line, AB, the image can be distinctly seen in the horizon glass, but not in the suspended glass, as it is clear the surface of that glass makes no angle with the point of sight, being parallel thereto.

Should you consider this design worthy of a place in your Magazine, and any of your readers be induced to offer any remark upon it, they will render an essential service to seamen generally, and an assistance to the projector of the plan, who is a working mechanic.

I am, Sir,
Yours respectfully,
J. S.

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### NEW THEORY OF THE AURORA BOREALIS.

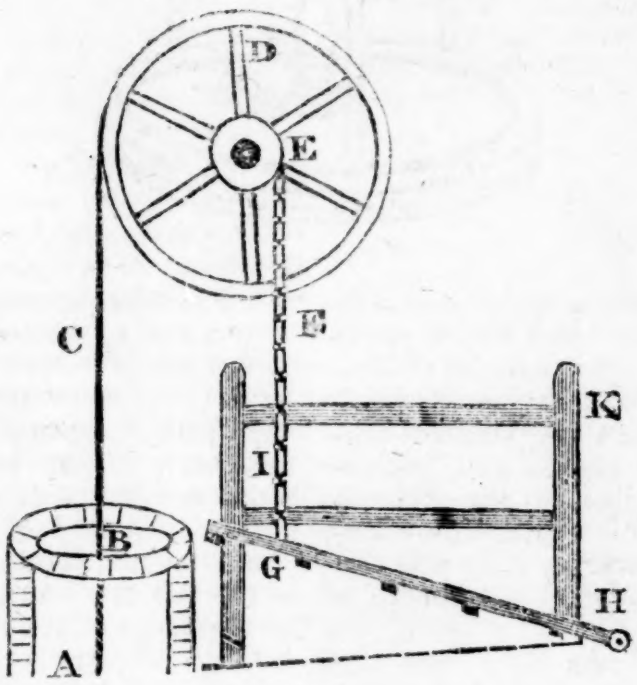
The last number of the *Edinburgh Philosophical Journal*, contains a memoir by Professor Hansteen, in which that eminent naturalist has sketched out a very bold and plausible theory of the Aurora Borealis The connection of that phenomenon with magnetism has been long remarked, and is farther confirmed by the observations of the professor. He considers the Aurora Borealis as a luminous ring, surrounding the magnetic pole, with a radius varying from 20 degrees to 40 degrees, and at the height of about 100 miles above the surface of the earth.

It is formed, he thinks, by luminous columns shooting upwards from the earth's surface, in a direction parallel to the inclination of the needle, and to the direction of the earth's magnetism; these columns render the atmosphere opaque while they pass through it, and only become luminous after they pass beyond it. From the outer or convex side of the ring, beams dart forth in a direction nearly perpendicular to the arch, and ascend towards the zenith: and if they are so long as to pass through the south, they collect in the south in a sort of corona or glory, which is situated in that part of the heavens to which the south pole of the needle points.

Professor Hansteen finds that the observations made respecting the Northern Aurora are well explained by this hypothesis; and he has collected facts to show that a similar ring exists round the Southern magnetic pole situated in New Holland, the Northern being in North America. He infers farther, though the stock of observations is rather deficent, that similar luminous rings exist above the two extremities of the secondary magnetic axis, in Siberia and in Terra del Fuego.

Philadelphia, June, 1825.

## METHOD FOR CATTLE TO RAISE WATER FOR THEMSELVES TO DRINK.




A Correspondent proposes the following method for cattle to raise water for themselves to drink.

*Description of the engraving.*

A represents a well, so situated as to answer for three or four fields.

B, its mouth, or the place where the cattle will drink from the bucket, which is suspended from the rope, C, that is attached to the periphery of the wheel, D, framed into the shaft E.

To the chain, F, passing upwards, and around the shaft, E, in an opposite direction to the rope, C, the platform, G, centred at H, is appended.

An animal wanting to drink, will enter the stall represented by K, and when its gravity is exerted at I, it will occasion the platform to descend, and the bucket in the well to rise through a distance corresponding with the difference of the circumference of the shaft E, and wheel D, so that it can drink. When the animal retires from the platform, the bucket pre-

perly loaded for the purpose, descends into the well and becomes again filled with water, by means of a valve adapted to its bottom.

Our Correspondent also suggests a plan for connecting levers, appended to appropriate centres, to the handles of pumps of large calibre; so that when cattle visit such watering places, they may work them, and furnish themselves with a supply of water.

Of this character a gate, furnished with a long lever, counterbalanced and left partly open, so that an animal may get his head through, would answer the purpose very well.

But it would not do to rely on any contrivance of this kind, without frequently examining it, lest it should get out of order, and produce disastrous results to the animals.

Philadelphia, June, 1825.

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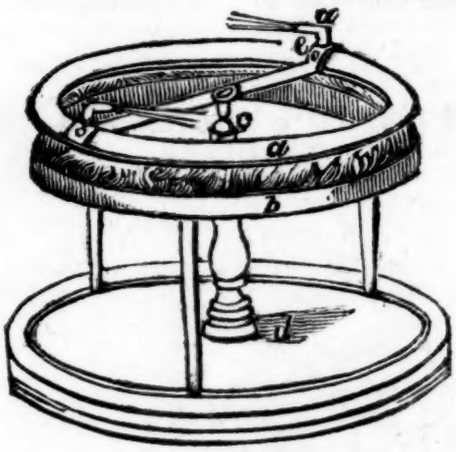
## FIRST STEAM ENGINE.



For a long time the reputation of the first discoverer of the steam engine was accorded to the Marquis of Worcester. But it was afterwards discovered that Branca, an Italian of some celebrity as an author and philosopher, had anticipated the Marquis some years in the application of this power to machinery. This was supposed to be a final settlement of claims in regard to this subject. But quite recently it has been discovered that a new claimant to this distinguished honour, appears in Heron of Alexandria, who flourished about a century before the commencement of the Christian era. And now we shall not be much surprised if finally it should be traced back to Tubal Cain, that cunning antediluvian worker in metals.

Mr. Partington lately exhibited a model of Heron's steam engine, made by Mr. Slytes, to a London audience, of which the annexed figure is a representation. The upper circumference of the machine, *a*, is filled with water, and supported on the pillar *d*, at the top of which it turns on the pivot C. The water being boiled by the flame of alcohol in the trough *b*, the steam issues rapidly from the small apertures as at *e*, and the opposite extremity of the transverse diameter, and the machine continues to revolve on its axis as long as heat be applied, and it contains water.

WATT.

New-York, July, 1825.

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### STEAM ENGINES.

SIR,—In *Stuart's Descriptive History* of the Steam Engine, it is remarked that in 1804, Messrs. Vivian and Trevithick accomplished what was first suggested as far back as 1759, by Dr. Robison—the application of steam power (by high pressure engines) to moving of carriages.

Now it is a fact well known in Philadelphia, that the late Mr. Oliver Evans applied this power to the same

purpose and by the same kind of engine, as early as 1798. In this year (which be it recollected, was four years previous to that in which Messrs. Vivian and Trevithick patented their high pressure engines, and six years previous to the application above named) Mr. Evans transported on wheels a large mud scow with its dredging apparatus, which he had been employed to construct for the Corporation of that city, from the corner of Ninth and Market-streets to the River Schuylkill, by means of his high pressure engine, which had then been some time perfected.

On arriving at this river the scow was launched into the water; paddle wheels were substituted for the carriage wheels, and Mr. Evans successfully applied the same engine to propel this vessel, notwithstanding the awkwardness of its structure, as applicable to expeditious motion, at the rate of three or four miles per hour, to the east side of the city, a distance of 16 or 18 miles, according to the sinuous course of the rivers.

So much for Messrs. Vivian and Trevithick's claims to the first application of steam power to drive carriages and put engines in motion by an extraordinary condensation of the steam.

Had Mr. Evans lived in a more enterprising community, and the extent of his genius and his acumen been better understood, it is highly probable that he would have reflected honours on it, fully equivalent to the patronage which was necessary to secure to him the reputation of extensive success in these, and no doubt, in many other instances.

A FRIEND TO JUSTICE.

Philadelphia, June, 1825.

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### NEW TIDE MILL.

SIR,—By giving the following a place in your Magazine, you will oblige A. B.

Philad. May 30th, 1824.

That long desired object, the practical application of tide water to the propelling of water wheels and other machinery, is now offered by the Patentee for the inspection of his fellow citizens, at the sign of Noah's Ark, in North Front street, near Noble street, Philadelphia. The principle upon which it operates can be seen by inspection of the model now in operation. It has received the approbation of some of our most distinguished citizens, who are accustomed to view inventions of this kind, with mechanical and scientific minds.

It has also received the decided approbation of the Franklin Institute, the report of the Committee on the subject having been adopted by the unanimous vote of the Board of Managers.

The following extract from the report, contains a description of the machinery:

"The Committee on Robert Leal's Tide Mill, report, That they have examined his mode, which simply consists of a water wheel to be put in motion by the tide. The axis of the wheel, which is horizontal, rests upon uprights, placed on a box, which is made to float in a chamber, with the *rise* and *fall* of the tide: one end of the water wheel shaft is geared with a cog-wheel that meshes into one of smaller diameter, being permanently fixed to a shaft which rests upon two piers, to which is attached the common gearing of a saw mill.

"The part of the machine claimed as *new* and *original* by the inventor, consists solely in the attachment formed between the floating water wheel shaft, and the one fixed on the pier or wharf: this is effected by a connecting *bar* or *rod*, placed with a loose collar round the ends of the two shafts, moving in such manner as to preserve the mesh of the cog-wheels at the same distance apart, notwithstanding the rise and fall of the shaft of the floating wheel."

(Signed) WILLIAM STRICKLAND, *Ch'rm.*"

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### OBSERVATIONS ON THE BAROMETER, AS APPLICABLE TO THE ISLAND OF CEYLON.

The scale of variation in the barometer, being of a very limited nature between the tropics, compared with that of latitudes at a greater distance from the equator, makes that valuable instrument, in general, be considered, especially by superficial observers, as of little service in the former case; yet there is no doubt but by an attentive and careful observation, it may be made subservient to many useful purposes, and become, in the hands of the agriculturist and

navigator, an equally valuable instrument even in low latitudes. It is only necessary to know its scale and its language. A sudden fall of two or three tenths of an inch of the mercury in the tube is probably the prognostic of as great a change in the atmosphere as the fall of as many inches in some other parts of the world; and as the observation is as readily made in one case as the other, it becomes of importance to be noted.

The following remarks and observations, made during a period of several years in Ceylon, are offered, not with a view of establishing any fixed principle with regard to the above instrument, and of the laws by which its movements are regulated, but more to serve as general hints in any future observations that may be made, and to afford the opportunity of forming comparisons therein with any observations made in other parts of India, and between the tropics.

At Colombo, which lies in latitude 6° 56′ North, and close on the seashore, the barometer appears decidedly to undergo four periodical changes or revolutions in the course of twenty-four hours, amounting in general to about one-tenth of an inch, being highest about nine o'clock in the morning, sinking towards three in the afternoon, rising again towards nine at night, and sinking again towards three in the morning. There does not appear to be any sensible difference between the position of the mercury in the tube in the morning and at night—the point at which it stands in the morning being generally the same as at night.

Heavy rains do not affect the barometer in an equal degree proportionally with that in high latitudes, nor do hard squalls of a sudden nature or short duration affect it any more than in other parts of the world; but a smart gale of wind of any strength and continuance will sink the mercury to the extent of about three-tenths of an inch; and though that change may not take place so great a period of the time previous to the gale commencing as in other latitudes, yet still, by a careful and attentive observation, it will give a sufficient warning of the approach of a gale, so as to prove of very great utility to ships at anchor in the roads of Colombo, or off the coast. In the month of November 1819, previous to the commencement of a smart gale of wind from the north-west, the mercury, which had been at 29.9 inches, fell to 29.7, with the thermometer at 76° of Fahrenheit, and remained low during the continuance of the gale, and gradually continued rising previous to the gale abating, and in several similar instances it has never been known to fail.

The variations in the rise and fall of the mercury do not appear to be affected in any remarkable manner, or influenced by heat or cold, or to undergo any changes with the thermometer in similar cases, but it appears to stand highest in steady, fixed, settled weather. The different monsoons do not appear to affect it, though at the changes thereof a variation takes place in its rise and fall.

The average height of the mercury throughout the year may be considered as about 29 9 inches; the highest range 30.1 nearly, and the lowest about 29.7, making the greatest range somewhat near half an inch; and this observation may be considered as applying to barometers on board the ships in the roads and off the coast, as the difference probably is very trifling between those and barometers on shore, and near the sea-coast on a low elevation.

No sensible difference has hitherto been observed in the barometer on the western and eastern sides of the island; for, at the time of a gale of wind on the western side, during the southwest monsoon, the same changes occur in the rise and fall of the mercury on the eastern side, and *vice versâ*.

In the city of Kandy, situated at the distance of about eighty miles inland, and at a computed elevation of about 2,500 feet above the level of the sea, during the month of October, the maximum of the barometer, while the thermometer was at 76° of Fahrenheit, was 28.452 inches, and the minimum while the thermometer

was 70°, was 28.272. Sufficient observations have not as yet been made to determine with accuracy the general average height, but it may be considered as about 28.3 inches; and similar to what occurs at Colombo, it is always higher in the morning about nine o'clock, and at night, than at the hour of three. In fact, this periodical rise and fall of the mercury appears of so fixed and established a nature, that there is no doubt an attentive observer of the barometer may thereby mark the above hours and intervals of time with very tolerable accuracy, where the state of the atmosphere and the weather has not, during the time of observation, undergone any very material change.

The following additional remarks and observations on the barometer, though not applicable to this island, may notwithstanding be deemed not unworthy of a place in the Transactions of the Ceylon Literary Society.

At the Mauritius, or Isle of France, in the month of January 1819, the mercury in the barometer falling to 29.10 inches, was followed by a very violent hurricane; and as the gale abated, the mercury again gradually rose and continued rising till it reached 29.80 inches, the thermometer of Fahrenheit during the time of the gale varying from 75 to 81 degrees.

At the town of Port Louis, in the month of February, being the middle of summer, while the average height of Fahrenheit's thermometer, was 86°, that of the barometer was 27.7¾ in French inches and lines; the English foot being to the French as 12 is to 12.816.

At Madras, in the month of October, 1818, the mercury in the barometer fell to 28.78 inches, which was considered as unprecedented at that place, and was followed by a very violent gale of wind, which gradually abated as the mercury continued to rise, until it reached the height of 29.8 inches, which it had been at the previous part of the day. The thermometer during the time of the gale was in general about 74 degrees: and at the same place, in the month of May, 1820, the mercury fell eight-tenths of an inch below the height which usually indicated a gale of wind, and was accompanied by a very heavy gale, and an unusual fall of rain.

Off the Cape of Good Hope, the mercury in the barometer falling down to 29.60 inches, is almost invariably the prognostic of a storm; the usual average height is that of about 30 inches, and to which height it again gradually rises as the gale abates, and continues at that elevation while the weather is serene and fair. A good Marine Barometer is there of absolute and essenteal service, as these gales often come on suddenly, without any remarkable change in the appearance of the heavens or atmosphere, but are invariably foretold by the barometer. It is however to be observed, that the steady strong breezes, almost approaching to a gale, and which blow from the south-east in the summer season, have a tendency to raise instead of sinking the mercury. In that latitude it is not ascertained if the periodical changes already alluded to take place the same as at Ceylon, though probably not, as that very extraordinary and unaccountable circumstance appears to be confined to the tropics and equatoril region,—The mercury there has been observed during the month of May to rise to the height of 30.4 inches nearly; but the average height may be considered, as above stated, 30 inches in general.

## MANUFACTURING SALTS BY EVAPORATION ON FAGGOTS.

Mr. Bakewell's Travels in the Tarentaise, &c. have furnished a most interesting description of the Salt Works at Montiers, "perhaps the best conducted of any in Europe, with respect to economy." Nearly three millions of pounds of salt (comprising, however, not only common salt, but Glaubur's salts, and the alkaline salts sold to the glass manufacturers) are extracted annually from a stream of water, which would scarcely be noticed, except for medical purposes

in any other country. The waters of Montiers, too, have only half the strength of sea-water. It may seem extraordinary that water of this quality should repay the expense of evaporation; but the process by which it is effected is so simple, ingenious, and economical, that Mr. Bakewell thinks it may be even introduced with advantage on many parts of our own coast, should the salt duty be entirely removed. The process is that of evaporation by faggots—a process which, though often mentioned by English writers, is so little known, that it has been recently gravely described as consisting in throwing salt water upon burning faggots, and gathering the salt that remained! Water so weakly impregnated with salt as to contain only one pound and a half in every thirteen gallons, could not repay the expense of evaporation *by fuel* in any country. The evaporation by faggots is entirely an atmospheric process. At Montiers there are four evaporating houses, called Maisons d'Epines, (literally, houses of thorns) and which are little else than large wooden frames, open at top and at the sides, filled with double rows of faggots of black-thorn. The water is poured in gentle streams, from numerous conduits at the top of these houses, upon the faggots; as it trickles through, a portion of the sulphate of lime is deposited in incrustations on the twigs, and in its concentrated state, the water is received into troughs placed at the bottom. The first two houses concentrate the water to about three degrees of strength; in the third, it is concentrated to the strength of twelve per cent., that is, reduced to about one-seventh of the original quantity. In the fourth it is farther concentrated, till it nearly reaches the point of saturation, when it passes a large building, where are the pans for boiling, and where the salt is crystalized in the usual method. Mr. Bakewell's description (to which we must refer for more minute details) is so complete, that it may enable any person to erect similar works in this country.

## RAISING PINE APPLES BY STEAM.

If the information which we have received be correct, we shall soon have pine apples as plentiful as oranges, and this rich fruit, the taste of which is unknown to more than nineteen-twentieths of the British people, will form the *bonne bouche* of the good folks in the pits and galleries of our theatres, and be hawked about the streets "three for a shilling." The cultivation of pine apples in this climate has hitherto, we believe, been a matter of some difficulty and uncertainty; and we have been assured, that notwithstanding the high price at which they are sold, they scarcely remunerate the grower for his trouble. It is probable, however, that in this article as in many others, the price is artificially kept up, and the production purposely limited, to prevent its becoming less an article of luxury, and therefore less valuable to those who consider scarcity and high price as the only criterions of excellence. Were pine apples cultivated generally upon even the present system, we might, perhaps, obtain for four shillings that for which we now pay fifteen; but the result would be very unsatisfactory to the cultivator, for the price would still be too high for general consumption, and too low to maintain the reputation of the fruit, as one with which no Alderman or Bishop could dispense, if he pretended to good taste, or the means of treating his friends properly. It is with pine apples as with Champaign wine, they are both excellent things in their way; but if we reduce their price to just such a scale that they may be obtained by the middling classes, we take away their value in the estimation of the rich, and without so reducing them, they will not be generally used, nor remunerate the producers by the increased amount of consumption. Whether Champaign wine will ever become the beverage of those who now content themselves with "heavy wet" and "blue ruin," is a great question; but they have at least the prospect of getting pine apples cheap, and of

drinking pine apple brandy. A manufacturer in the country, who has a steam engine on his premises, and a considerable portion of superfluous steam, has conceived the idea of growing pine apples by means of this superfluity. The steam is introduced under the roots of the plant, and the warmth and moisture together operate so powerfully upon it, that it soon arrives at maturity; whilst the body of the plant, being freely exposed during the day to the open air, acquires a firmness and healthiness which contributes powerfully towards the fine flavour of the fruit, and renders it very superior to that which is produced in close hot-houses. We have not yet had any means of judging how far the economy of this principle is carried, but we can at least assure our readers, that it is no longer theoretical. We have seen and tasted pine apples so produced, and certainly no flavour could be more delicious. In a few days we may probably be enabled to give a more minute account of this new mode of cultivation, and the exact expenditure which attends it.

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### SUPERIOR WHITE COPPER.

A paper from Schweigger's Journal, by C. Keferstein, gives an interesting account of a white copper which has for a considerable period been made and manufactured at Suhl, in the Duchy of Saxe Hildburghausen, and employed for the mounting of guns or firelocks, as also for spurs, and similar articles. This metal strongly resembles silver, even to deception, keeps excellently without tarnishing, is not brittle, but, on the contrary, extremely malleable, and contains no arsenic, like the metallic compound usually called white copper. The following are its component parts:—

| | |
|---|---|
| Copper | 88,000 |
| Nickel | 8,753 |
| Sulphur, with a little Antimony | 0,750 |
| Silex, Clay, and Iron | 1,750 |
| | 99,253 |

It is now about eighty years ago since this metal was first observed, and came into use; but the source of it has become so exhausted, that at present little is found, and a pound of the slag containing it, fetches as much as two dollars Prussian currency. Mr. Keferstein considers it to be a similar alloy to the *packfong* or *tutenag* of China, and recommends that experiments should be instituted with the view of ascertaining whether a compound calculated to be of such value in the arts, cannot be artificially produced.

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### SILVER SOLDER.

Edinburgh, Feb. 12, 1824.

GENTLEMEN;—I take the liberty of calling your attention to the article Solder, which you must be aware is of great importance to a numerous class of workmen in metals. I have examined the Encyclopædia Britannica, and some other books on this subject, in search of a particular silver solder, but could never find it. The solder I allude to runs very easy, and is very nearly as white as silver, so that the joining can hardly be discovered. It is used in the manufacture of tea-plate ware at Sheffield, &c., but would be useful for many other purposes, were it generally known, especially to silversmiths. Having made several experiments to discover a solder of this description, I send you the most successfull, as the solder obtained by it runs easy, and may be useful for some purposes, particularly when used near another soldered part. It is not, however, so near the colour of silver as that I have mentioned.—Take 1 oz. of pure silver, 1 oz. of spelter solder (such as is used by braziers), and nearly 2 dwts. of grain tin, and melt them in the order stated. The rolling must be very carefully performed, and the solder must be frequently annealed, as it is very brittle. I have made some other trials with arsenic, but have not been able to pursue them to a satisfactory result. If any of your correspondents know the component parts of the Sheffield solder alluded

to, and would have the goodness to communicate it, I am sure it would oblige many, as well as

A LEARNER.

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### CORAL ROCKS.

Mr. Barrow, in his voyage to Cochin China, in giving an account of the coral reefs and coral islands in the East Indies, states, that in the West Indies and indeed all over the Atlantic, though large masses and fragments of the coraline are frequently to be met with, it is remarkable that no island or reef of this substance has yet been discovered. The coast of New Holland is girt round, on the eastern part, with reefs and islands of coral, rising like a wall from the depth of a sea in which no bottom could be found with a line of 150 fathoms. These reefs and islands are the production of the polypus, animals of the genus *coralina*, which are so small that they cannot be distinguished by the naked eye.

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### RESOURCES OF THE SPIDER.

The following trait in the natural history of the spider may be new to most of your readers:—As I was standing on a scaffold at the top of an unfinished house, I observed a common black spider descending one of the rafters. When he came within reach of me, I stopped his progress with a stick I held in my hand; and after making several fruitless attempts to pass down by me, he ascended again to the highest part of the rafter. After arriving there, he fixed his feet in a firm position, and erecting his body, began to emit a substance from it, which, when taking the air, ascended as fast as discharged. He continued this stream till it had attained the height of about 30 feet from the top of the house; as it ascended, it divided into thousands of the finest fibres, which, being reflected upon by the rays of the sun, presented a most brilliant sight. The spider now quitted his hold on the rafter, and ascending his web a little, which buoyed him up to that height was wafted away by the breeze, in quest, I suppose of a more hopitable place of abode.

B.

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### WALKING SPINNERS.

The female peasants on the river *Loire*, in France, have a mode of spinning, which enables them to perform the operation as they walk along the streets and roads. The distaff, having a long handle, is held under the left arm; the spool terminates at one end in an iron pin, pointed and made rough, so that with the thumb and finger of the right hand, a rapid twirl is easily given it, which draws out and twists the thread, the spool hanging loose as it runs round. The thread is then wound up, and another twirl is given in the same way. They spin hemp in this manner with facility as they watch their goats, sheep, or cows, grazing in the fields.

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### NEW ELECTRICAL PHENOMENON.

The electrical effect of stroking a cat briskly with one hand is well known Shocks may also be imparted to the other hand at the same time, by forming the electric circle as follows:—Let the cat be placed before a good fire some ten or fifteen minutes, and then taken upon the lap of the operator; by passing the palm of either hand over the back, the usual spark will be emitted, and by applying the other hand to the throat, so as that the finger and thumb touch the jaw or shoulder, the hand so applied will feel slight shocks, as if discharged by the *Leyden phial.*

E. K. W.

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### ADVANTAGES OF WEARING SILK.

At a time when so many shackles are about to be removed from the silk trade, and such boundless anticipations are entertained of its future advancement and prosperity, it may not be inopportune to point out a few of the recommendations which silk fabrics possess to more general adoption.

The power of electricity over the body is well known; in fact, we can never enjoy health or comfort without a proportion of it in the system.—When this portion is deficient, we feel languid and heavy, and very foolishly pronounce a libel on the blood, which is quite innocent, while we never suspect the damp atmosphere of robbing us of our electricity. Yet so it is. In dry weather, whether it be warm, cold, or frosty, we feel light and spirited, because dry air is a slow conductor of electricity, and leaves us to enjoy its luxuries. In moist or rainy weather we feel oppressed and drowsy, because all moisture greedily absorbs our electricity which is the buoyant cordial of the body. To remedy this inconvenience, we have only to discover a good non-conductor of electricity to prevent its escape from the body; and this we have in silk. Those, therefore, who are apt to become low spirited and listless in damp weather, will find silk waistcoats, drawers, and stockings the most powerful of all cordials. Flannel is also good, but not near so powerful as silk. Wash-leather is likewise a non-conductor of electricity, and may be used by those who prefer it. But silk is by far the best; and those who dislike to wear flannel next to the skin, will find equal benefit by substituting cotton shirts, drawers, and stockings, with silk ones over them; or, where more heat is required, flannel ones between the cotton and the silk, for the silk should always be outermost. We like to give reasons for our advice, and our readers may depend on the philosophy of these recommendations; we can answer for their being practically correct. Silk, indeed, should be used in every possible way by the weak—in the linings of sleeves, in the stiffners of neck-cloths, and even in the entire backs of surtouts, cloaks, mantles, and in the coverlets of beds, &c.; and where health is in question, it will in the end be found to be the most economical stuff that can be used, as it will save many an apothecary's bill. When it can be a principal means of preventing consumption, rheumatism, gout, inflammations, melancholy, madness, and even suicide itself, no expense ought to be spared.

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### SAFETY MASK.

The numerous and fatal accidents arising from *foul air* in wells &c., and the more gradually destructive effects of the noxious particles inhaled by the workmen in white lead, cotton, needle, and various other manufactories, make it extremely desirable that some means of protection from them should be devised. Permit me to recommend the use of a *sponge mask* while at work. Sponges, we know, have been used for filtering water, and why not also for filtering air? Choose, for example, a sound sponge, sufficiently large to cover the lower part of the face, say, the nose and mouth; scoop it with a sharp knife into a concave form, care being taken not to cut it too thin: then bind it on the edge with broad tape, and attach two pieces of tape or ribbon, by means of which it may be tied on to the back of the head. A mask of this sort has, in fact, been used, and a person with it on has been known to stay in a most foul cess-pool for a considerable time, without receiving the least injury, while a crust of poisonous particles adhered to the outside of the mask, which, if inhaled, would have destroyed him perhaps instantly. The mask, after having been once used, should be carefully cleaned and washed, and when about to be put on again, a little vinegar should be squeezed through it, to correct the effect of any noxious particles that may have been lurking in its interstices.

PHILANTHROPOS.

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### ARTIFICIAL SLATES.

A species of artificial slates have been used in Russia, which are said to be very valuable, as being lighter than common slates, inpervious to water, incombustible, and made of any required form or size. They have been analyzed by M. Giorgi, who finds them to consist of bolar earth, chalk, or carbonate of lime, strong glue,

paper pulp, and linseed oil. The earthy materials are to be pounded and sifted, and the glue dissolved in water; the paper is the common paper pulp, which, after being steeped in water, has been pressed, or it may be book-binders' or stationers' shavings boiled in water and pressed. The linseed oil is to be raw. The paper pulp is to be mixed in a mortar, with the dissolving glue, the earthy materials then added and beaten up, and the oil added during the beating, as fast as it is absorbed. The mixture is then spread with a trowel on a plank, on which a sheet of paper has been laid, and surrounded by a ledge, to determine the thickness of the layer, and is then turned out on a plank strewed with sand to dry. When dry, they are passed through a rolling-mill, then pressed, and finally finished by a coat of drying oil

The following are some of the various proportions recommended :—

2 parts paper pulp, 1 glue, 1 chalk, 2 bole earth, 1 linseed oil: this forms a thin, hard, and very smooth sheet.

3 parts paper pulp, 4 glue, 4 white bole earth, and 4 chalk; produce an uniform sheet, as hard as iron.

1 paper pulp, 1 glue, 3 white bole earth, 1 linseed oil: a beautiful elastic sheet.

When these plates or slates were steeped in water for four months, they were found not to alter at all in weight; and when exposed to a violent heat for five minutes, they were hardly altered in form, and were converted into black and very hard plates.

## ON DYEING COTTON OF A TURKEY RED.

The red cottons of the Turks have long been admired, but the occidentals tried in vain to imitate them.

Some years ago, a Mr. Papillon, a French dyer, set up a dye-house at Glasgow, for dyeing this red; and in 1790, the commissioners for manufacturers in Scotland paid him a considerable premium for communicating his process to Dr. Black, upon condition that it should not be published for a certain number of years. This time having expired, it has been made public, and affords a striking example of those successive and multiplied operations, which render the art of dyeing one of the most extensive and complicated arts practised by man. The whole process for dyeing this fine red, consists of nine successive operations.

First operation.—Supposing 100 lb. of of cotton to be dyed, a ley is to be made from 100 lb. of Alicant or Spanish barilla, by passing soft water through it, in separate parcels and repassing some of them, so that a part of the ley, called the strong ley, or barilla liquor as it is termed, may float an egg; or, in chemical language, be of the strength of 6 degrees of Beaume; or as we usually express it, be of the specific gravity, 1.04; while another smaller portion, called the weak barilla liquor, be of the strength of only 2 degrees, or about the specific gravity, 1.015.

Dissolve 20 lb. of pearlash in ten pails of soft water; each pail to hold four gallons.

Pour soft water upon 1 cwt. of fresh burnt quicklime, so soft as to strain off, when it becomes clear, fourteen pails of lime water.

When the leys are become clear, draw off ten pails of the strong barilla liquor, the pearlash ley, and the lime water; mix them together, and boil the 100 lb. of cotton in this mixed liquor for five hours, then wash it in running water, and dry it.

Second operation.—Second bath, or grey steep. Put ten pails of strong barilla liquor into a tub, and add two pailsful of sheep's dung; then pour in two quart bottles of oil of vitriol.

Dissolve 1 lb. of gum Arabic and 1 lb. of sal amoniac in a suffiient quantity of the weak barilla liquor, and add it the other.

Mix 25 pints of olive oil with two pails of weak barilla liquor, and add it also to the former.

The materials for this steep being well mixed, tread the cotton down into it until it is well soaked; let it steep a day and night, then wring it well, and dry it.

Steep it again a day and night, and again wring and dry it.

Steep it a third time a day and night, wring and dry it, and lastly wash it well and again dry it.

Third operation.—The white steep. Prepare a steep in the same manner as in the second operation, but leave out the sheep's dung, and steep, wring, and dry, three times as before,—then wash and dry.

Fourth operation.—Gall steep. Boil 25 lb. of bruised nut galls in ten pails of soft water, till about half is boiled away; then strain the liquor into a tub, and pour some cold water on the galls left in the strainer, to wash out all the virtue, which add to the boiling liquor. When this liquor has become milk-warm, dip your cotton, hank by hank, into it, handling it, carefully all the time, and let it steep a day and night: then wring it carefully, and dry it well without washing it.

Fifth operation.—First alum steep. Dissolve 25lb. of Roman alum in fourteen pails of warm water, but not boiling: take off the scum very carefully; add two pails of strong barilla water, and then let it cool until it is lukewarm.

Dip your cotton in this liquor, and handle it well, each hank by itself. Let it steep for a day and night, then wring it, and dry it well, without washing it.

Sixth operation.—Second alum steep. Is to be made exactly the same as the last; but after the cotton is dry, steep it for six hours in a clear river, and then wash and dry it.

Seventh operation.—Dyeing steep. Put 28 pails of water into a copper boiler; make them wilk-warm; add about two gallons and a half of bullock's blood, and afterwards 25 lb. of madder, then stir all well together.

Take about 10 lb. of the cotton and put it upon sticks, dip it into the liquor, and keep moving it for an hour, gradually increasing the heat, until at the hour's end the liquor begins to boil; then let the cotton sink, and boil it gently for an hour; afterwards wash and dry it.

Take out so much of the boiling liquor, that what remains may render the fresh liquor, with which the copper is to be filled up, just milk-warm; add the blood and madder, and make up a dyeing liquor, as before, for the next 10 lb of cotton.

Eighth operation.—The fixing steep. Mix five or six pails of the grey steep liquor with as much white steep liquor; tread down the cotton into this liquor, and let it steep for six hours; then wring it moderately and equally, and dry it without washing.

Ninth operation.—The brightening steep. Dissolve 10 lb. of white soap in sixteen or eighteen pails of warm water; taking care that no little bits remain undissolved, as that would spot the cotton: add four pails of strong barilla water, stir it well, sink the cotton in this liquor, keeping it down with cross sticks, and cover it up: then boil it gently two hours, wash it, dry it, and it is finished.

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### TALLOW CHANDLERS' BOILERS RENDERED INNOXIOUS.

Mr. Henry Fothergill, of Benwell Colliery, in Northumberland, has lately invented a simple and ingenious mode of erecting tallow chandlers' boilers, by which the offensive effluvia so much complained of by those in their neighbourhood is completely destroyed; and the workshop, being entirely cleared of the vapour from the kettle, is also rendered more cool and comfortable. The boiler is erected in such a way, that the fire is made to surround it equally on the outside, beneath the surface, and the fire is supplied with atmospheric air only from above, the ash-pit being wholly closed up by an iron moveable plate. The tube or chimney is so constructed as to make the foul vapour pass downwards, and through the fire, where it is completely consumed. The prominent advantages of Mr. Fothergill's valuable invention are, 1. A saving of about one-half of the fuel used on the old plan; 2. A considerable saving of time in the melting process, and also in the hardening of the dips, the workshop being, on this plan, cleared of the heated vapour; and 3. Ridding the neighbourhood of these melting-houses of the nuisance continually complained of, arising from the offensive effluvia, and for which the proprietors are always liable to be indicted.

Mr. Fothergill has already erected several boilers in Newcastle and the neighbourhood for some of the principal tallow chandlers, who have expressed great satisfaction at the many advantages they derive from the invention.

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### A MODE OF DRYING DAMP WALLS.

It very often happens that apartments on the ground-floor, particularly if the house be situated near a common sewer, or other receptacle for filth, are so damp that they cannot be successfully papered; and, if papered, the paper soon moulders and decays. To remedy such an evil, the following plan is recommended in a French Journal:—"There was a large room which was always damp, and after a variety of means had been employed to render the walls dry, it was resolved to pull them down. Under these circumstances, it was recommended to wash them with sulphuric acid, which was done; the deliquescent salts were decomposed, and the room was afterwards perfectly dry."—*Chemist.*

### SIZING OF PAPER.

Upper Clatford.

GENTLEMEN :—It has often occurred to me when sizing paper in the tub, that some simpler method might be discovered to supersede that tedious and expensive process.

It may be necessary for the information of some of the readers of the Mechanic's Magazine, to inform them, there are two methods of sizing paper : one is called tub sizing, the other engine sizing. Tub sizing takes place after the paper has been made and dried ; it is then soaked in a glutinous liquid, made from parchment cuttings, or fellmonger's pieces, which gives the paper that firmness of texture which engine-sized paper so much wants ; all writing papers are sized this way : engine-sized paper is so called because the ingredients are put to the stuff in the engine befor it is made into paper. The ingredients generally consist of about 1 lb. of dissolved soap, and 4 lbs. of alum to one engine (as it is called) of stuff. This method is by far the least expensive, and, in my opinion, might be brought to perfection so as nearly, if not quite to supersede the necessity of tub sizing. At present the greater part of the printing papers are sized this way.

If any of your correspondents could suggest any ingredients to put to the stuff (for that, I think, is the way it must be done, either with or without the soap) and alum, that will give the paper the firmness of tub-sized when dry, and not injure it in any other respect, he will cause a great expense and labour to be saved in the manufacture of this useful article. I am, Gentlemen,

Your obedient servant,
A PAPER-MAKER.

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### COLOURING THE BACKS AND COVERS OF BOOKS.

For colouring the backs and covers of books, three liquids are employed as the basis for every colour : the first a solution of copperas in water, which, according to its strength, will produce every shade of grey to the most intense black ; second, a solution of kali (salt of worm-wood), in water, for every shade of brown ; and thirdly, a solution of grain tin in aqua-fortis, which is essentially necessary for producing those beautiful yellows, reds, and blues, so much admired. When this last is used alone, or diluted with water, it will make the natural colour of the leather approach to white ; but if mixed with a strong decoction of French berries, it will produce a *yellow* ; if with a decoction of red sanders of logwood, red ; if with a decoction of indigo, a fine blue. And thus any colour, by mixture, may be produced.

I ought to mention that the above may be either used as mixed with the spirits, or the leather may be washed over several times with the decoctions used hot, and then either washed or sprinkled with the spirits, according to fancy.

Though not a bookbinder by trade, stil I can speak from experience of the efficacy of the above directions, which I have no doubt, in the hands of an ingenious mechanic, will be hints quite sufficient to enable him to excel in that art, of which I am a great admirer.

Your obedient servant,
G. A. S.

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### METALLIC CASTINGS.

Iron and metallic castings are stated to be very much improved, by subjecting the metal, when in the moulds, to pressure. This is done by making a part of the mould of such a form as to receive a piston, which, on the metal being introduced, is made to press on it with any required force. It is stated that castings obtained in this way are not only free from the imperfections generally incurred in the usual mode, but have a peculiar soundness of surface and closeness of texture, qualities of the utmost importance in ordnance, rolling cylinders, &c.

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### MODE OF SOLDERING, IN THE CONSTRUCTION OF TELESCOPES.

The following is a safe and neat mode of soldering a piece of brass to the back of the little speculum of a

telescope, as a fixture for the screw to adjust its axis: telescopes of any construction may be neatly put together by the same means—Having well cleaned the parts to be soldered, cut out a piece of tin-foil, the exact size of them; then dip a feather into a pretty strong solution in water of sal-ammoniac, and rub it over the surfaces to be soldered; then place the tin-foil between them as fast as you can, for the air will quickly corrode their surfaces, so as to prevent the solder taking, and give the whole a gradual and sufficient heat to melt the tin. If the joints to be soldered have been made very flat, they will not be thicker than a hair, though the surfaces be ever so extensive.

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### ON A POWDER TO CLARIFY WINES AND OTHER LIQUORS.

There is sold in France, at a very dear rate, in proportion to its value, a brownish red powder, for the clarification of wines. The mode of using this powder, is to spread it lightly on the top of the liquid, and when it is well dissolved, to pour the mixture into the cask finishing the process in the usual manner.

This clarifying powder, according to Gay-Lussac, one of the most celebrated chemists of the French metropolis, is only dried blood; and he has prepared it, by eareful desiccation, superior to any which is usually sold.

The blood is only efficacious by the albumen, or white-of-egg matter, which it contains; and if it be desired to preserve its solubility in water after drying, the heat must not be carried so high as to destroy this property. The process must consequently be perfected at a lower temperature than 160°, the point at which albumen coagulates into a solidness.—The whites of two eggs are said by M. Gay-Lussac to contain at least as much albumen as the quantity of powder employed for the clarification of 200 litres (about 54 gallons) of wine. M. Gay-Lussac considers it more advantageous, both on the score of economy, as well as to avoid the unpleasant smell of glue possessed by dried blood, which might alter the flavour of fine wines, to make use of the white-of-egg.

M. Gay-Lussac has prepared a powder with the dried whites of eggs, which has not the same inconveniences as that made from the blood; but which dissolved easily in water, and clarified extremely well.

This powder may be used not only for wine, but for any other fluid in domestic economy, requiring clarification.

This dried blood is not a new article in commerce; Dr. George Fordyce many years ago had a laboratory between the Borough and Lambeth, for the drying of blood, by means of a water bath; and sold it for exportation to the West Indies, where it was used for clarifying the cane juice. To prevent the possibility of the heat being raised too high by careless laborants, his apparatus was constructed with several vessels, hung one within another, so that as each vessel caused a diminution of the heat, the heat in the innermost vessel which contained the blood was prevented from rising so high as to coagulate it, and render it no longer redissoluble in water. This dried blood being prepared from a waste article, little used in its raw state, must be considerably cheaper than dried whites of eggs, and sufficient for ordinary purposes. It ought at least to attract the attention of butchers.

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### ON CAVIARE AND BOTARGO.

The caviare is only the eggs of this fish purified and salted in a particular sort of brine. There are two kinds of it, the black and the white; the former of which is the best. The name is also applied to a similar preparation procured from other species of the sturgeon, which are called in the country *sawrjugen* and *assetrin*. During certain years the Russians export into England and Italy more than 30,000 *puds*, or about 54 tons. There are three sorts of caviare sold in commerce: one of which is extremely salt, and is denominated in Russia *sernistaja ikra*, or granular caviare; another, which is the most esteemed, and

is designated under the Russian name *meschechnaja ikra*, or caviare pressed into bags. It has the advantage of being able to be preserved for a longer time, and to resist putrefaction more than the others. The last species known under the name of the caviare *turc*, is much more susceptible of putrefaction than the former, and consequently somewhat inferior.

In certain districts of Russia they prepare an inferior article called by us botargo, with the eggs of the white salmon, *mugil cephalus*; and of a species of pike which inhabits the Volga, the flesh of which is moreover much esteemed.

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### BOOK GILDING.

John Robertson, bookbinder in Montrose, has invented a machine for gilding books on the back. It performs its operation with great accuracy and quickness, enabling the gilder to finish fifty uniform volumes in the course of an hour. It works by weight, receives the necessary temperature from hot sand, and can be employed about thirty-five minutes with the heat that is thus given. He calls it a weight pullet, from a tool of that name, used for the same purpose.

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### NORTON'S SPIRAL WHEEL.

GENTLEMEN;—I had a model of a similar wheel to that invented by Mr. Norton, and noticed in your last, made about twenty years ago, and thought at first it would be useful in tide-mills. I accordingly tried it both ways, horizontally and vertically, but found the power so much less than that of the common water-wheel, on account of the greater friction caused by the water sliding along the screw, and the great pressure endways of the bearings, as well as the difficulty of keeping the water on the wheel without waste between the spiral floats and the casing (which was a complete cylinder), that I came to the conclusion that it could never be used to advantage. X. Y.

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### PERMANENT INK FOR MARKING LINEN.

Mix together in a phial 100 grains of lunar caustic two drachms of gum arabic, one scruple of sap green, and one ounce of rain water.—The cloth to be marked must first be wetted with the following liquid, and suffered to get quite dry before writing on it. One ounce of sal soda, dissolved in two ounces of rain water, when the articles are marked they should be exposed to the sun, which will turn the writing quite black.

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Our Correspondent S. B. D. of Dutchess County, will find the figure of a spiral wheel for propelling boats on the plan of the model he has obligingly sent us in the London Mechanics' Magazine. The angle of the floats to the plane of motion, to produce a maximum effect, should not exceed 22° or 25°—when more oblique, the power is expended in proportion to the increase of this obliquity, in a horital direction on the water. Experiments on these wheels have been numerous in this country, and though varied in form as skill or whim could direct, they have in every instance been found inferior to the other methods in use. An attempt was made to propel a boat by one of them in Baltimore, as we have been informed, and it succeeded, but the boat's velocity through the water did not exceed two or three miles an hour.—ED.

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*Communications for the American Mechanics' Magazine,*
*Post paid, and addressed to*
**JAMES V. SEAMAN,**
*Broadway, New-York, will receive due attention.*

William Van Norden, Printer.